**HCNA-HTTD**
**Huawei Certified Network Associate-Transmission Technologies and Device**
**HUAWEI TRANSMISSION CERTIFICATION**

## 1. Basic Optical Communication Technology

Course Description
Chapter 1 Fiber
1.1 Preparatory Knowledge
1.2 Basics of Fiber
1.2.1 Structure and Profile of Refractive Index of Fiber
1.2.2 Modes of Fiber
1.2.3 Loss of Fiber
1.2.4 Dispersion of Fiber
1.2.5 Cutoff Wavelength
1.2.6 Mode-Field Diameter (MFD) and Effective Area
1.2.7 Classification of SMF
1.2.8 Non-linearity Effects of SMF
1.3 Summary and self-assessment
1.4 Questions
Chapter 2 Passive Components
2.1 Passive Components in Optical Network
2.1.1 Dielectric Thin Film Filter
2.1.2 Fiber Grating
2.1.3 Arrayed Waveguide Grating-AWG
2.1.4 Comb Filter
2.1.5 Optical Coupler and Optical Splitter
2.1.6 Isolator and Circulator
2.1.7 Optical Switch
2.2 Summary and self-assessment
2.3 Question

## 2. SDH Principles

Course Description
Chapter 1 SDH Overview
1.1 The History of Optical Transmission Network
1.2 The Definition and Background of SDH
1.3 SDH Working Process
1.4 SDH Features
1.5 Summary
1.6 Question
Chapter 2 The Frame Structure and Multiplexing Method of SDH Signals
2.1 SDH Frame Structure
2.2 SDH Multiplexing
2.3 Summary
2.4 Question
Chapter 3 Overhead and Pointer
3.1 SDH overheads
3.1.1 Section Overheads
3.1.2 Path Overheads
3.2 SDH Pointers
3.2.1 Administrative Unit Pointer——AU-PTR
3.2.2 Tributary Unit Pointer——TU-PTR
3.3 Summary

**3. WDM Principle**



**4. OTN**

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**5. Ethernet Technologies**



**6. Packet Switching  Technology**

5.4.5 Standards and Protocols
5.5 PWE3 Encapsulation of ATM Services
5.5.1 Encapsulation Model
5.5.2 Encapsulation Modes and Formats
5.5.3 Key Technologies of ATM PWE3
5.5.4 Standard and Protocol
5.6 Application of the PWE3 Technology
5.7 Summary
5.8 Excises
Chapter 6 Acronyms and Abbreviations

**7. OptiX SDH Equipment Hardware**
1.Product Introduction
2.Cabinet, Sub-rack
3.Boards
4.Common Network Elements and Configuration
5.Features

**8. OptiX SDH Networking and Self-Healing Protection**
1. SDH Network Topologies
1.1 Optical networking introduction
1.2 Classification of topologies
1.3 Sub-networks
2. Survivable networks and their protection mechanisms
2.1 Survivable networks introduction
2.2 Types of protection

**9. iManager NMS System Introduction**
1.Architecture and Main Features of U2000
1.1 Telecommunications Management Network Concept
1.2 Network Management Layer of U2000
1.3 U2000 System Architecture
1.4 Interfaces of U2000
1.5 Managed Equipment of U2000
1.6 Hardware and Software Requirement
1.7 The User Interface of U2000
1.8 Processes of U2000
1.9 NMS Maintenance Suite: MSuite
1.10 License Introduction
2.Directory Structure of U2000
3.Main Functions of U2000
3.1 Topology Management
3.2 Network Management Layer
3.3 E2E Management
3.4 Fault Management
3.5 Performance Management
3.6 Inventory Management
3.7 Security and data Management
3.8 NBI

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**1O. Practices**

1. SDH Network and PDH Service Configuration
1.1 "SDH Network and PDH Service Configuration Practice"
1.2 "SDH Network and PDH Service Configuration Practice"
1.3 "SDH Network and PDH Service Configuration Practice"
1.4 "SDH Network and PDH Service Configuration Practice"
1.5 "SDH Network and PDH Service Configuration Practice"
2. Ethernet Services and Networking Applications
2.1 "Ethernet Service Configuration Practice"
2.2 "Ethernet Service Configuration Practice"
2.3 "Ethernet Service Configuration Practice"
2.4 "Ethernet Service Configuration Practice"
2.5 "Ethernet Service Configuration Practice"

**BENTLEY FIBER CERTIFICATION**

**MicroStation V8i**
Getting Started
Mouse Functions
Opening MicroStation
Setting up a MicroStation
Design Files
Creating a Design File
Accessing Menus
Boxes
Views
Levels, Filters and Attributes
Placing Elements
Placing Lines
Placing Arcs
Placing Text
Placing Cells
Manipulating Elements
Deleting Elements
Copying Elements Parallel
Modifying Elements
Changing and Matching Element Attributes
Grouping Elements
Copying, Moving, Scaling, Rotating and Mirroring Elements
Patterning Elements
Measuring Elements
Making Sheets
Referencing Files
Placing Sheets and Clipping Reference Files
Manipulating Sheets and Filters
Draw Box Culvert in Profile Use DGN Batch Text Editor
Calculate and Label Slope
Rotate Element to Horizontal
Plotting and Making PDF's
Plotting One Sheet
Plotting Multiple Sheets
Making PDF's

**Introducing Bentley Map**
Introductory Knowledge
what is Bentley Map?
Three Bentley Map editions
Overview features
XFM Feature Modeling
Data Storage
Bentley Geospatial Administrator
Starting Bentley Map
Bentley Map's Interface
Using Bentley Map
Module Review
Using the Map Manager
Introductory Knowledge
Introduction to the Map Manager
Starting the Map Manager
The Map Manager dialog
Attaching Maps and Raster Images
Attaching vector maps
Attaching raster images
Attaching Features
Seamless mapping
Managing Feature Display

**BENTLEY FIBER CERTIFICATION**

Changing the display of features
Changing the display order
Changing the display range
Changing the symbology of features
Changing Coordinate Readout
Creating layer groups
Making Features Active for Edit
Labeling and Annotating Features
Converting labels to annotation
Browsing and Searching for Features
Creating Buffers and Overlays
Module Review
Placing and Editing Features
Introductory Knowledge
XML Feature Modeling
Defining an XFM project
Using the Command Manager
Tools
Placing Features
Property based symbology (PBS)
Property based annotation (PBA)
Using plot scale
Editing Feature Properties
Editing source data
Analyzing Features
Dynamic Feature Scoring
Dynamic Feature Scoring rules
Session specific features
Promoting Features
Promoting to a simple feature
Promoting to a collection feature
Module Review
Interoperability
Introductory Knowledge
Interoperability in Bentley Map
Other GIS File Formats
Referencing GIS Files
Importing GIS Files
Using Import Settings Files (IMPX)
Saving import settings
Importing data using an import settings file
Referencing data using an import settings file
Importing CSV and ODBC Data Sources
Creating a VRT file
Importing the data
Importing GML Data Sources
Importing 3D Data
Exporting to Other GIS File Formats
Exporting to I models
Publishing i models
Bentley Map and i models
Using Bentley Map FME Extension
Importing data from FME into Bentley Map
Exporting data from Bentley Map using FME
Datasets
Filtering and schema mapping
Coordinate systems
Error handling
Module Review
Cleaning and Creating Topology

**BENTLEY FIBER CERTIFICATION**

Introductory Knowledge
Introduction Topology
Topology Cleanup
Topology Cleanup tools
Using rainbow masking
Finding duplicate line work
Finding similar line work
Finding line work fragments
Thinning linear elements
Segmenting linear elements
Finding gaps
Finding dangles
Checking quality
Connecting line work
Creating Topology
Creating centroids
Creating shapes from line work
Associating linkages
Validating topology
Splitting and merging polygons

**Bentley Fiber V8i**
Bentley Fiber Using Short Transaction Spatial Persistence Mode
Long Transaction Persistence with Expert Designer for Comms
Oracle Spatial Tools
Bentley Fiber Using the DGN Persistence Mode
Bentley Communications Menu
Comms-Admin
Modules
Reference Files (DGN Persistence Only)
Utilities
Help
Setup
Fiber/Copper ISP Setup
Engineering
Settings
Clear Located Devices
Erase Temp Levels
Unload
Layout
Route
Jumper
Slack
FTTP Boundary
FTTP
Insert
Insert to Existing
Merge Spans
Merge Sheaths
Move
Break
Reconnect
Connect To
Check
Post Strand Change Circles
Change
Delete
Populate
Global

**BENTLEY FIBER CERTIFICATION**

Override
Review
Data
Sheath Information
Device Info
Create Splice Pairs
Cross Section
Global
Segment
Number
Review
Check
Connections
Manual (Splice Enclosures)
Modify Connected Splices
Manual (Node Connections)
Auto
X-Conn
Check
Data Capture
Customer Assignment
OS/Circuit Mgr
As Built
Engineering Calculations
Engineering Calculation Specification
Input Signal Levels
Signal Levels Calculation
Operations
Locate Outage
Locate Customer
Locate Slack
Locate Path
Activate Address (FTTx Design and Operations Utility)
Work Order Example
Confirm Activation
Fiber Utilization
Wavelength Utilization
Reports
Device Information
Node Connectivity
OS Trace
Internal Report
BOM
Reel BOM
FTTP BOM
Splicing Data
Internal BOM
Bentley Mapping
Railroad
Waterline
Lot Lines
Roads
Intersection Cleaning
Building
Base Text
Boundary
Cul-de-sac
Strand Management
Setup
Strand Resource File

**BENTLEY FIBER CERTIFICATION**

Edit a Strand Resource File
Strand Mapping
Place
Strand Symbols
Utility
BOM (Strand Bill of Materials)
GPS
Unload
Duct Management
Starting the Duct Management Module
Duct Setup
Duct Equipment Specifications
Place
Enclosure
Bundle
Edit
Insert
Merge Bundle
Connect
Review/Change
Modify Enclosure
Modify Bundle
Delete
Reports
BOM
Locate Spare
Wall Diagram

**Bentley Inside Plant**
Bentley Inside Plant Using the Spatial Persistence Mode
Long Transaction Persistence with Expert Designer for Comms
Oracle Spatial Tools
Bentley Inside Plant Using the DGN Persistence Mode
Bentley Communications Menu
Comms-Admin
Modules
Reference Files (DGN Persistence Only)
Utilities
Help
Setup
Equipment Specifications
Device Assignment
Import/Export
Inside Plant Layout
Floor Plan
Place Rack
Place Equipment
Copy Rack
Check Data
Change
Delete
Connections
Inside to Inside
Inside to Outside
Inside to Inside (Elev)
Reports
BOM
Connection
Patch and Patch 2
Wire Run

Bentley

**BENTLEY FIBER CERTIFICATION**

Rack Elevation
Build Schematic
Circuit Trace
Services
Rack Report